

Claims

I CLAIM:

5        1. A method for improving a quality of a signal in a separation scheme by employing a plurality of stationary sensors, the method comprising:

- (a) sensing information about a fluid particle with at least some of the plurality of stationary sensors and producing at least one signal for each stationary sensor used, based on said information;
- (b) operating on the signals using an operation selected from a group consisting of integration, summation, and statistical correlation to create a signal with greater signal to noise ratio than any of the individual plurality of signals; and
- (c) using said signal with greater signal to noise ratio to produce a chromatogram.

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20        2. The method of claim 1 wherein additional information is sensed about a plurality of fluid particles, said additional information being combined to produce a chromatogram.

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3. The method of claim 1 wherein the fluid particle flows in a capillary tube along which the plurality of sensors is arrayed, and wherein the step of sensing information about a fluid particle with at least some of the plurality of stationary sensors comprises the steps of:

- (a) selecting a first sensor when the fluid particle is located adjacent to said first sensor;
- (b) sensing information about the fluid particle with the first sensor;
- (c) selecting a second sensor when the fluid particle is no longer located adjacent to the first sensor but is adjacent to the second sensor; and
- (d) sensing information about the fluid particle with the second sensor.

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4. The method of claim 3 wherein the location of the fluid particle is determined by detecting a marker spike.

5. The method of claim 4 wherein the marker spike arises from a difference between a refractive index between a sample solvent and a separation solvent.

6. The method of claim 4 wherein the marker spike arises from a spike reproducibly related to at least one separated peak.

10 7. The method of claim 4 wherein the marker spike, reproducibly related to a separated peak, is upstream of all sample peaks in the separation.

8. The method of claim 4 wherein the marker spike is an absorbance spike.

15 9. The method of claim 8 wherein the marker spike is generated by adding an absorbance marker with a reproducible relationship to a location of the sample injection.

20 10. The method of claim 8 wherein the marker spike is generated by adding an absorbance marker with a reproducible relationship to a timing of a sample injection.

25 11. The method of claim 10 wherein the absorbance spike arises from an absorbance marker added in a solvent.

12. The method of claim 3 wherein a second plurality of sensors sense information about additional fluid particles during a time when the fluid particle is adjacent to the first sensor.

30 13. The method of claim 12 wherein a number of the second plurality of sensors

is predetermined.

14. The method of claim 12 wherein the sensed information from the second plurality of sensors is assembled into a chromatogram.

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15. The method of claim 1 wherein the plurality of sensors are photocell sensors.

10 16. A method for improving a quality of a signal in a fluid-based separation scheme by employing a plurality of stationary sensors, the method comprising:

- (a) stopping a fluid solution adjacent to the plurality of stationary sensors;
- (b) sensing information about the solution with at least some of the plurality of stationary sensors;
- (c) operating on signals from each of the at least some of the plurality of stationary sensors using an operation selected from a group consisting of integration, summation, and statistical correlation to create a signal with greater signal to noise ratio than any of the individual plurality of signals; and
- (d) using said signal with greater signal to noise ratio to produce a chromatogram.

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20 17. The method of claim 16 wherein the step of stopping the fluid solution comprises the steps of:

- (a) detecting a solvent spike in the solution;
- (b) tracking said solvent spike as it moves; and
- (c) stopping the solvent spike in the neighborhood of a predetermined photocell sensor.

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18. The method of claim 16 wherein a predetermined number of sensors are used as the at least some of the plurality of sensors.

19. The method of claim 16 wherein the operated on signals are assembled into a chromatogram.

5           20. The method of claim 16 wherein the plurality of sensors are photocell sensors.

10           21. An apparatus for improving a quality of a signal in a fluid-based separation scheme, the apparatus comprising:

- (a) a plurality of stationary sensors for sensing information about a fluid particle; and
- (b) at least one calculation unit operating on the signals using an operation selected from a group consisting of integration, summation, and statistical correlation to create a signal with greater signal to noise ratio than any of the individual plurality of signals.

15           22. The apparatus of claim 21 wherein additional information is sensed about a plurality of fluid particles, the apparatus additionally comprising means for combining said additional information to produce a chromatogram.

20           23. The apparatus of claim 21 wherein the fluid particle flows in a capillary tube along which the plurality of sensors is arrayed, and wherein sensing information about a fluid particle with the plurality of stationary sensors is accomplished with apparatus comprising:

- (a) a first selector for selecting a first sensor when the fluid particle is located adjacent to said first sensor; and
- (b) a second selector for selecting a second sensor when the fluid particle is no longer located adjacent to the first sensor but is adjacent to the second sensor.

24. The apparatus of claim 23 additionally comprising means for determining the location of the fluid particle by detecting a solvent spike.

5           25. The apparatus of claim 23 additionally comprising a second plurality of sensors to sense information about additional fluid particles during a time when the fluid particle is adjacent to the first sensor.

10           26. The apparatus of claim 25 including means to predetermine a quantity of the second plurality of sensors.

15           27. The apparatus of claim 25 including means for assembling the sensed information from the second plurality of sensors into a chromatogram.

15           28. The apparatus of claim 21 wherein the plurality of sensors are photocell sensors.

20           29. An apparatus for improving a quality of a signal in a capillary separation scheme by employing a plurality of stationary sensors, the apparatus comprising:

25           (a) means for stopping a flow of a solution adjacent to the plurality of stationary sensors;

              (b) sensors for sensing information about the solution with at least some of the plurality of stationary sensors; and

              (c) at least one calculation unit operating on signals from each of the at least some of the plurality of stationary sensors using an operation selected from a group consisting of integration, summation, and statistical correlation to create a signal with greater signal to noise ratio than any of the individual plurality of signals.

30           30. The apparatus of claim 29 wherein determining an appropriate stopping point for the flow of the solution comprises the steps of:

- (a) means for detecting a solvent spike in the solution;
- (b) means for tracking said solvent spike as it flows; and
- (c) means for stopping the solvent spike at a predetermined photocell sensor.

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31. The apparatus of claim 29 including a means for determining a predetermined quantity of sensors to be used as the at least some of the plurality of sensors.

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32. The apparatus of claim 29 including means to assemble the operated on signals into a chromatogram.

33. The apparatus of claim 29 wherein the plurality of sensors are photocell sensors.

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